

1 Information Processing Apparatus

BACKGROUND OF THE INVENTION

Field of the Invention

5 The present invention relates to an information processing apparatus for sending data to an output device, such as a printer, which is connected through a bidirectional interface.

Related Background Art

10 Conventionally, a printer which is connected to a host computer through an interface (e.g., a Centronics interface) analyzes input data from the host computer and develops bit-map data as output data of, e.g., a laser beam printer. The printer then scan-exposes a  
15 photosensitive drum with a laser beam modulated on the basis of this developed data, thereby outputting image data.

In the case of a printer with an emulation function, a plurality of printer control language  
20 systems (command systems) can be processed; the printer can execute printing while switching an emulation mode and a native mode in accordance with application programs that a user executes. The printer of this type has switches for switching programs for  
25 interpreting the printer control languages and card slots for giving switching designation.

1           The printer of the above type, however, has no  
function of checking compatibility of a language  
environment, which is preset in the printer, before  
starting printing. Therefore, if printing is started  
5 by transferring print data to the printer  
notwithstanding that the language environment preset in  
the printer differs from the language environment that  
an application has set, unexpected results are printed.

          As described above, under a print system  
10 environment in which printer control languages are  
selectively used (i.e., an environment in which a  
plurality of printer drivers can be selectively  
executed), a printer control language to be used is  
determined in accordance with a hardware environment  
15 set by a user. Therefore, if the printer control  
language environments of a host computer and a printer  
do not match each other, a printing failure occurs  
because there is no relieving means for obtaining  
matching. When the printer is located apart from the  
20 host computer and print data with a large number of  
pages is processed, a user does not notice the  
situation at once, resulting in a serious problem of  
waste of a paper resource due to unnecessary printing.

          In addition, in switching between the language  
25 environments as described above, if a memory  
environment is freed, the contents (forms, user fonts,  
and the memory setting of a RAM) set in a memory of a

1 printer are erased by rewriting. Therefore, even when  
the same language environment is selected again, not  
only the information about the forms, the user fonts,  
and the like but the memory map of the RAM cannot be  
5 reproduced correctly. This makes it impossible to  
ensure the printing under the environmental status  
before the switching.

If, on the other hand, the memory environment is  
controlled in such a manner as to keep the status  
10 before the language environments are switched, a memory  
space usable after the switching is rather limited.  
This significantly decreases the recording efficiency  
in the environment after the switching.

#### SUMMARY OF THE INVENTION

15 The present invention has been made to solve the  
above problems, and has as its object to provide an  
information processing apparatus capable of determining  
matching between an environmental setting status and a  
printer connected through a bidirectional interface and  
20 automatically selecting a printer driver which is  
compatible to the printer control language data of the  
printer, thereby obtaining the matching between of a  
printer environment and the printer that is connected  
to allow communications and to provide an information  
25 processing apparatus capable of managing registration  
of printer environment information set in a memory of a  
printer connected through a bidirectional interface by

1 monitoring the environment switching status with  
respect to the printer, thereby managing the printer  
environment for each language that is set once with  
good reproducibility with respect to the printer.

5 In order to achieve the above object of the  
present invention, there is provided an information  
processing apparatus comprising acquiring means for  
acquiring information stored in a memory of a printing  
device connected through a bidirectional interface, and  
10 selecting means for selecting a printer driver  
corresponding to the information acquired by the  
acquiring means from a plurality of printer drivers on  
the basis of the information.

In addition, in order to achieve the above object  
15 of the present invention, there is provided an  
information processing apparatus comprising storing  
means for acquiring and storing data stored in a memory  
of a printing device connected through a bidirectional  
interface, and transferring means for transferring the  
20 data stored in the storing means in order to store the  
data in a memory of the printing device when the  
printing device executes processing on the basis of  
data different from the data stored in the storing  
means.

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1     BRIEF DESCRIPTION OF THE DRAWINGS

      Fig. 1 is a sectional view showing the arrangement of a first recording apparatus to which the present invention is applicable;

5       Fig. 2 is a perspective view showing the outer appearance of a second recording apparatus to which the present invention is applicable;

      Fig. 3 is a block diagram for explaining the control system of the second recording apparatus shown  
10     in Fig. 2;

      Fig. 4 is a block diagram for explaining the arrangement of a printer control system according to the first embodiment of the present invention;

      Fig. 5 is a block diagram for explaining  
15     environmental setting switching processing executed between a host computer and a printer shown in Fig. 4;

      Fig. 6 is a flow chart showing an example of an environmental setting switching procedure according to the first embodiment of the present invention;

20     Fig. 7 is a block diagram for explaining the environmental setting switching processing executed between the host computer and the printer shown in Fig. 4;

      Fig. 8 is a schematic view showing the memory map  
25     of a RAM shown in Fig. 7;

1        Fig. 9 is a flow chart showing an environmental  
setting switching sequence according to the second  
embodiment of the present invention;

5        Fig. 10 is a block diagram for explaining another  
environmental setting switching processing executed  
between the host computer and the printer shown in  
Fig. 4;

10       Fig. 11 is a flow chart showing an environmental  
setting switching sequence according to the third  
embodiment of the present invention;

Fig. 12 is a flow chart showing an environmental  
setting switching sequence according to the fourth  
embodiment of the present invention; and

15       Fig. 13 is a flow chart showing an environmental  
setting switching sequence according to the fourth  
embodiment of the present invention.

#### DESCRIPTION OF THE PREFERRED EMBODIMENTS

20       Before an explanation of the arrangement of this  
embodiment, the arrangements of a laser beam printer  
and an ink jet printer suitable for this embodiment  
will be described below with reference to Figs. 1 to 3.  
Note that a printer to which this embodiment is applied  
is not limited to the laser beam printer and the ink  
jet printer but may be a printer of another printing  
25       system.

Fig. 1 is a sectional view showing the arrangement  
of a first recording apparatus, for example, a laser

1 beam printer (LBP), to which the present invention is  
applicable.

Referring to Fig. 1, an LBP main body or printer  
1500 receives and stores print information (e.g.,  
5 character codes), form information, or macro  
instructions supplied from an externally connected host  
computer. The LBP main body 1500 forms character  
patterns or form patterns corresponding to the input  
information and forms images on recording paper as a  
10 recording medium. The LBP main body 1500 includes an  
operation panel 1501, on which switches and LED  
indicators for operations are arranged, and a printer  
control unit 1000 for controlling the overall LBP main  
body 1500 and analyzing character information and the  
15 like supplied from the host computer. The printer  
control unit 1000 primarily converts character  
information into a video signal with the corresponding  
character pattern and applies the signal to a laser  
driver 1502. The laser driver 1502 is a circuit for  
20 driving a semiconductor laser 1503; the laser driver  
1502 switches on and off a laser beam 1504 emitted from  
the semiconductor laser 1503 in accordance with the  
input video signal. The laser beam 1504 scan-exposes  
an electrostatic drum 1506 while being oscillated  
25 sideways by a rotary polygon mirror 1505. As a result,  
an electrostatic latent image of the character pattern  
is formed on the electrostatic drum 1506. This latent

1 image is developed by a developing unit 1507 arranged  
around the electrostatic drum 1506 and transferred onto  
recording paper. Cut sheets are used as the recording  
5 paper, and these cut sheets are housed in a paper  
cassette 1508 attached to the LBP main body 1500. The  
cut sheets are fed into the printer and supplied to the  
electrostatic drum 1506 by a paper supply roller 1509  
and paper feed rollers 1510 and 1511. The LBP main  
body 1500 also has at least one card slot (not shown)  
10 through which optional cards and control cards  
(emulation cards) for different language systems can be  
connected and used, in addition to internally stored  
fonts.

Fig. 2 is a perspective view showing the outer  
15 appearance of a second recording apparatus, for  
example, an ink jet recording apparatus (IJRA), to  
which the present invention is applicable.

Referring to Fig. 2, a carriage HC engaging with a  
spiral groove 5004 of a lead screw 5005 which is  
20 rotated in association with the forward and backward  
rotations of a drive motor 5013 via driving force  
transmission gears 5011 and 5009 has a pin (not shown)  
and is therefore reciprocated in directions indicated  
by arrows a and b. An ink jet cartridge IJC is mounted  
25 on the carriage HC. A paper holding plate 5002 urges  
paper against a platen 5000 over the full width in the  
carriage moving direction. Photocouplers 5007 and 5008



1 function as home position detecting means for checking  
the presence of a lever 5006 of the carriage in this  
area and performing switching between the rotational  
directions of the motor 5013. A support member 5016  
5 supports a cap member 5022 for capping the entire  
surface of a recording head, and a sucking means 5015  
for sucking the interior of the cap to perform  
suction-recovery for the recording head through an  
opening 5023 inside the cap. A cleaning blade 5017 can  
10 be moved forward and backward by a member 5019. A main  
body support plate 5018 supports the members 5017 and  
5019. A lever 5012 for starting suction of the  
suction-recovery moves in association with the movement  
of a cam 5020 which engages with the carriage,  
15 controlling the driving force from the drive motor  
through a known transmitting means, such as clutch  
switching.

The apparatus is arranged such that capping,  
cleaning, and suction-recovery can be performed at  
20 their respective positions by the action of the lead  
screw 5005 when the carriage moves to an area on the  
home position side; that is, a desired operation need  
only be performed at a timing known to those skilled in  
the art.

25 Fig. 3 is a block diagram for explaining the  
control system of the second recording apparatus shown  
in Fig. 2.

1           Referring to Fig. 3, this control system includes  
an interface 1700 for applying recording signals, an  
MPU 1701, a program ROM 1702 for storing, e.g., control  
programs to be executed by the MPU 1701, and a DRAM  
5   1703 for storing various data (such as the recording  
signals and recording data to be supplied to a head).  
A gate array 1704 controls the supply of the recording  
data to a recording head 1708 and also controls the  
transfer of data between the interface 1700, the MPU  
10   1701, and the DRAM 1703. A carriage motor 1710 carries  
the recording head 1708, and a paper feed motor 1709  
feeds recording paper. A head driver 1705 drives the  
recording head, a motor driver 1706 drives the paper  
feed motor 1709, and a motor driver 1707 drives the  
15   carriage motor 1710.

          In the recording apparatus with the above  
arrangement, when a recording signal is applied from a  
host computer 100 (to be described later) through the  
interface 1700, this recording signal is converted into  
20   recording data for printing by the gate array 1704 and  
the MPU 1701. Then the motor drivers 1706 and 1707 are  
driven, and the recording head is also driven by the  
recording data supplied to the head driver 1705,  
thereby executing printing.

25           The MPU 1701 can perform communications with the  
host computer 100 (to be described later) through the  
interface 1700; the MPU 1701 can inform the host

1 computer 100 (to be described later) of memory  
information related to the DRAM 1703 and resource data  
and can also communicate with a printer connected to  
the host computer 100 to automatically determine the  
5 environmental setting status of that printer, thereby  
automatically setting printer environments matching  
each other.

The MPU 1701 can also transfer data set in the  
memory of the printer to the host computer 100, as a  
10 temporary registration file, when switching is  
performed between printer control languages. When  
printing is finished after the switching between the  
printer control languages, the MPU 1701 transfers the  
temporary registration file back to the printer to  
15 reset the data, thereby restoring the printer  
environment of the printer.

[1st Embodiment]

Fig. 4 is a block diagram for explaining the  
arrangement of a printer control system according to  
20 the first embodiment of the present invention. The  
first embodiment will be described below by taking the  
laser beam printer (Fig. 1) as an example. Note that  
the present invention can be applied to any of a single  
apparatus, a system comprising a plurality of  
25 apparatuses, and a system in which processing is  
executed via a network, such as a LAN, provided that  
the functions of the present invention are executed.

1           Referring to Fig. 4, the host computer 100 has a  
CPU 1 for executing processing for documents consisting  
of graphics, images, characters, tables (including  
spreadsheets), and the like on the basis of document  
5   processing programs stored in a ROM 2. The CPU 1  
systematically controls individual devices connected to  
a system bus 4.

          The ROM 2 stores the control programs of the CPU 1  
shown in the flow charts of Figs. 6, 9, 11, 12, and 13.  
10   A RAM 3 serves as a main memory and a work area for the  
CPU 1. A keyboard controller (KBC) 5 controls key  
inputs from a keyboard 9. A CRT controller (CRTC) 6  
controls a display on a CRT display (CRT) 10. A disk  
controller (DKC) 7 controls access to a hard disk (HD)  
15   11 and a floppy disk (FD) 12 which store boot programs,  
various applications, font data, user files, edit  
files, and a printer driver file 11a (to be described  
later). A printer controller (PRTC) 8 is connected to  
the printer 1500 through a predetermined bidirectional  
20   interface (interface) 13 and executes processing for  
controlling communications with the printer 1500.  
Interface circuits 8a and 18a control command  
communication processing and recording information  
processing executed between the printer 1500 and the  
25   host computer 100 through the interface 13.

          The CPU 1 executes processing for developing  
(rasterizing) an outline font into a display

1 information RAM set in the RAM 3, allowing WYSIWYG on  
the CRT 10. The CPU 1 also opens various registered  
windows on the basis of commands designated by a mouse  
cursor or the like on the CRT 10, executing various  
5 tasks of data processing.

In the printer 1500, a printer CPU 14  
systematically controls access to various devices  
connected to a system bus 17 on the basis of control  
programs and the like stored in a ROM 15 and outputs  
10 image signals as print data to a printer mechanism  
(printer engine) 20 connected through a printer  
interface 19. The CPU 14 can also execute  
communications with the host computer via an input unit  
18, informing the host computer 100 of memory  
15 information concerning a RAM 16, resource data, and the  
like. The RAM 16 functions as a main memory and a work  
area for the CPU 14. The memory capacity of the RAM 16  
can be extended by an optional RAM connected to an  
expansion port. Note that the RAM 16 is used as a  
20 recording data development area 16b, an environment  
data storage area 16a, an NVRAM, and the like to be  
described later.

The printer control system also includes at least  
one card slot (not shown) so that optional font cards  
25 and cards (emulation cards) storing programs for  
interpreting printer control languages of different  
language systems can be connected and used, in addition

1 to internally stored fonts. Furthermore, the printer  
control system has an NVRAM (not shown) for storing  
printer mode set information from the operation panel  
1501.

5 In the printer control system with the above  
arrangement, when the CPU 1 acquires, at a  
predetermined timing, information concerning the  
printer control language stored in the RAM 16 (to be  
described later) of the printer 1500 connected to the  
10 host computer through the bidirectional interface 13,  
the CPU 1 analyzes the acquired information related to  
the printer control language, designating switching  
between the printer drivers. In accordance with this  
switching designation, the CPU 1 sets the matching  
15 printer driver environment in the host computer 100.  
Therefore, even if the printer environment of the host  
computer does not match that of the printer connected  
to allow communications between them, the matching  
printer environment is automatically set. Note that  
20 the information concerning the printer control language  
is either a program (emulation program) for  
interpreting a printer control language, which is  
stored in the ROM 15 of the printer 1500, or a program  
(emulation program) for interpreting a printer control  
25 language, which is stored in the emulation card  
described above.

1           More specifically, when drivers (corresponding to  
different printers) for a plurality of printer control  
language systems can be used in the system in which the  
host computer 100 and the printer 1500 are connected  
5           through the bidirectional interface 13, the CPU 1 of  
the host computer 100 acquires information (such as  
identification information for specifying a program for  
interpreting a particular printer control language)  
concerning a printer control language from the RAM 16  
10          of the printer 1500. The CPU 1 then checks matching  
between the control language systems of the printer  
driver and the printer on the basis of the acquired  
information in the work area of the RAM 3 of the host  
computer 100 by referring to a table (showing  
15          correspondences between information concerning the  
printer control languages and the printer drivers). If  
no matching can be obtained, the CPU 1 obtains matching  
by switching to a printer driver corresponding to the  
acquired information. Consequently, a user can perform  
20          printing by using an appropriate printer driver without  
performing selection of the printer driver. In this  
case, the timing at which the information related to  
the printer control language is acquired is the timing  
at which the system is initialized (i.e., a power  
25          source switch is turned on) or the printing start  
timing. Note that the table in the RAM 3 shows printer  
drivers usable by the host computer 100 and information

1 concerning printer control languages corresponding to  
the printer drivers. This table is formed when the  
power source switch of the host computer 100 is turned  
on.

5 The printer environmental correspondence setting  
processing executed by the printer control system  
according to the present invention will be described  
below with reference to Fig. 5.

Fig. 5 is a block diagram showing the printer  
10 environmental matching setting processing executed  
between the host computer 100 and the printer 1500  
shown in Fig. 4, in which the reference numerals as in  
Fig. 4 denote the same parts.

Referring to Fig. 5, the printer driver file 11a  
15 stores various printer drivers PRD1 to PRDN  
corresponding to drivable printer control languages.  
The printer driver file 11a is registered in, e.g., the  
hard disk 11, and a desirable printer driver can be  
selected from it. Therefore, printing can be executed  
20 by properly switching the printer drivers PRD1 to PRDN  
on the basis of the information about the printer  
control language acquired from the printer. The  
relationship between the printer drivers stored in the  
printer driver file 11a and the corresponding printer  
25 control languages is stored in the above-mentioned  
table (not shown) in the RAM 3.



1           An environment data area 16a for, e.g., a first  
printer language system is an environment data storage  
area (to be described later) of the RAM 16, which is  
constituted by form (ruled line) data, user font data,  
5   RAM data, and the like. Information (e.g., PRCL1)  
concerning a currently designated printer control  
language is set as the RAM data. The operation panel  
1501 includes keys for setting various modes and keys  
for recovery from errors. A control card C which is  
10   connected when the printer 1500 is to be activated in  
an emulation mode is inserted into a card slot S. When  
this control card C is inserted, PRCL1, for example, is  
designated, and "PRCL1" is set as the RAM data.

          If, however, a plurality of pieces of emulation  
15   control information are stored in the ROM 15,  
information related to a corresponding printer control  
language designated by, e.g., the operation panel 1501  
is set as the RAM data.

          Fig. 6 is a flow chart showing a printer  
20   environmental correspondence setting sequence according  
to the first embodiment of the present invention, in  
which processing steps S601 to S605 are illustrated.

          First, in step S601, the CPU 1 designates a  
printer control language information acquisition  
25   request by using a command, as information for asking  
the printer 1500 the kind of a control language. This  
designation of the acquisition request is performed

1     when the system is initialized (e.g., when the power  
source switch is turned on) or when a print start  
instruction is output. Upon receiving the answer, in  
step S602, the CPU 1 of the host computer 100 acquires  
5     printer control language information from the  
above-mentioned RAM data area of the RAM 16 of the  
printer 1500. In step S603, the CPU 1 checks on the  
basis of the printer control language information  
acquired, while referring to the above-mentioned table  
10    in the work area of the RAM 3, whether a printer driver  
currently selected by the host computer 100 matches a  
printer control language currently set in the printer  
1500.

      If the printer control language in the printer  
15    1500 matches the printer driver in the host computer  
100 in step S603, the CPU 1 ends the processing; if  
not, the flow advances to step S604.

      In step S604, the CPU 1 searches for a printer  
driver corresponding to the printer control language by  
20    referring to the above-mentioned table. If the  
corresponding printer driver exists, the flow advances  
to step S605; if not, the CPU 1 ends the processing.

      In step S605, the CPU 1 designates switching to  
the corresponding printer driver on the basis of the  
25    printer control language information acquired. The  
matching of the printer driver environment in the host

1 computer is set in accordance with this switching  
designation, and the processing is ended.

As described above, switching between printer  
drivers is designated on the basis of printer control  
5 language information acquired from the memory (in this  
embodiment, the RAM 16) of the printer 1500 connected  
to the host computer 100 through the bidirectional  
interface 13, and the matching of the printer driver  
environment in the host computer is set in accordance  
10 with this switching designation. Therefore, even when  
the printer environment of the host computer does not  
match that of the printer connected to allow  
communications between them, an optimal printer driver  
can be selected automatically by setting the  
15 corresponding printer environment.

In this embodiment, the matching between the  
printer environments is automatically determined by the  
host computer 100. However, the processing for  
obtaining the matching between the printer environments  
20 can also be automatically activated by a control  
language switching designation from the operation panel  
1501 of the printer 1500 or by detecting the status of  
insertion and removal of the control card C.

In addition, in searching for a combination of a  
25 printer driver and a printer control language  
corresponding to each other, a priority order may be  
given to a plurality of printer drivers in the host

1 computer 100. Furthermore, the printer control system  
of the above embodiment has been described by taking  
the laser beam printer 1500 as an example, but the  
present invention is also applicable, of course, to the  
5 ink jet printer shown in Figs. 2 and 3 mentioned  
earlier.

In the above embodiment, the matching is set  
between the printer environments of the printer 1500  
and the host computer 100. In this case, to  
10 effectively use the memory (RAM 16) of the printer 1500  
for each individual printer control language, it is  
desirable that the entire area of the memory (RAM 16)  
of the printer 1500 be freed each time the printer  
control languages are switched. When the memory is  
15 freed, however, the contents already registered are  
erased. For this reason, the control must be performed  
in a way which sets the contents already registered in  
the memory with good reproducibility while effectively  
making use of the memory. This processing will be  
20 described below with reference to the second embodiment  
of the present invention.

[2nd Embodiment]

In the block diagram for explaining the  
arrangement of the printer control system shown in  
25 Fig. 4, when a CPU 1 acquires first printer environment  
data stored in a RAM 16 of a printer 1500 on the basis  
of the printer environmental switching status, the CPU

1 1 registers this first printer environment data  
acquired in a hard disk 11 or a floppy disk 12 as an  
internal file of a host computer 100. After this data  
registration performed by the CPU 1, second printer  
5 environment data corresponding to a second printer  
environment is set in an area 16a of the RAM 16 by the  
communication control function between the CPU 1 and a  
CPU 14, and the first printer environment data, which  
is registered in the internal file, is also stored  
10 again in the area 16a of the RAM 16 by the same  
function on the basis of the end status of printing  
corresponding to the second printer environment.  
Therefore, even if switching between the printer  
environments occurs frequently, the contents of printer  
15 environment data for each environment can be restored  
to the RAM 16 with good reproducibility.

More specifically, when a plurality of printer  
control language systems can be used in a system in  
which the host computer 100 and the printer 1500 are  
20 connected through a bidirectional interface 13, in  
command mode switching from the first printer  
environment (first printer language system) to the  
second printer environment (second printer language  
system), the first printer environment data (e.g.,  
25 registered form data and user font data) is transferred  
from the area 16a in the RAM 16 of the printer 1500 to  
the host computer 100, and the host computer 100 stores

1 the data in a file, such as the hard disk 11. The  
printer 1500 releases the first printer environment  
data storage area 16a of the RAM 16 to perform printing  
corresponding to the second printer environment.  
5 Thereafter, when the command mode is to be returned  
from the second printer environment to the first  
printer environment, the first printer environment data  
stored in the host computer 100 is sent to the printer  
1500, restoring the status of the printer 1500 before  
10 switching to the second printer environment. This  
makes it possible to effectively use the resource of  
the memory (RAM 16) of the printer in performing  
printing corresponding to the second printer  
environment, and to automatically restore the status of  
15 the print environment data in the RAM 16 before  
printing when the printing is entirely finished.

The printer memory resource release processing  
performed in environmental switching by the printer  
control system according to the present invention will  
20 be described below with reference to Figs. 7 to 9.

Fig. 7 is a block diagram for explaining  
environmental setting switching processing performed  
between the host computer 100 and the printer 1500, in  
which the same reference numerals as in Fig. 4 denote  
25 the same parts.

Referring to Fig. 7, the environment data storage  
area 16a for, e.g., a first language system consists of

1 form data (ruled line data), user font data, RAM data  
for storing, e.g., preset items inherent in a printer,  
and the like. A recording data development area 16b  
stores bit-map data in printing or is used as a work  
5 area. An NVRAM stores printer mode setting information  
from an operation panel 1501 (to be described later).

The operation panel 1501 includes keys for setting  
various modes and keys for recovery from errors.

Fig. 8 is a schematic view showing the memory map  
10 of the RAM 16 shown in Fig. 7.

Fig. 9 is a flow chart showing an example of an  
environmental setting switching procedure according to  
the second embodiment of the present invention, in  
which processing steps S901 to S906 are illustrated.

15 First, in step S901, the CPU 1 checks whether a  
change of printer environment data is designated by a  
keyboard 9 or a pointing device (not shown). If NO in  
step S901, the flow advances to step S903 to perform  
regular printing.

20 If YES in step S901, the flow advances to step  
S902, and the CPU 1 designates the CPU 14 to send the  
contents (e.g., the first printer environment data)  
stored in the printer environment data storage area 16a  
of the RAM 16 to the host computer 100.

25 In response to this designation, in step S902, the  
CPU 14 of the printer 1500 reads out the contents from  
the printer environment data storage area 16a and sends

1 pre-change environment data (e.g., the first printer  
environment data) to the host computer 100, and the  
host computer 100 stores the data in an internal file.  
In step S903, the printer environment data storage area  
5 16a is released so that the printer environment (second  
printer environment) after the environments are  
switched can effectively use the memory (RAM 16)  
maximally, and printing is executed by receiving  
recording information through known communication  
10 processing and performing bit map development. When  
the print job depending on the printer environment  
after the switching between the environments is ended  
in step S904, the CPU 1 checks in step S905 whether the  
environment data (e.g., the first printer environment  
15 data) of the printer 1500 is registered as an internal  
file. If NO in step S905, the CPU 1 ends the  
processing. If YES in step S905, the flow advances to  
step S906, and the CPU 1 reads out the registered file  
and transfers the readout file to the CPU 14 of the  
20 printer 1500, thereby resetting the printer environment  
data storage area 16a of the RAM 16 and reproducing and  
setting the contents of the RAM 16 corresponding to the  
status (first printer environment) before the  
environmental switching. Thereafter, the CPU 1 ends  
25 the processing.

As described above, the first printer environment  
data stored in the memory (RAM 16) of the printer 1500



1 which is connected to the host computer 100 through the  
bidirectional interface 13 is acquired on the basis of  
the printer environmental switching status and  
registered as an internal file of the host computer  
5 100. After this registration, the second printer  
environment data corresponding to the second printer  
environment is set in the memory of the printer, and  
the first printer environment data registered in the  
internal file is stored again on the basis of the end  
10 status of printing corresponding to the second printer  
environment. This allows reliable reproduction of the  
setting status of the memory for each environment upon  
switching between printer environments.

In addition, since switching between printer  
15 environments occurs when printer control language  
systems are switched, the setting status of the memory  
for each environment can be reproduced reliably upon  
switching between the printer control language systems.

In the above embodiment, when a request for  
20 switching printer control languages is generated by the  
keyboard 9 or the like of the host computer 100, the  
printer environment data of the printer 1500 is read  
out by the host computer 100 and registered as a  
temporary file. As shown in Fig. 10, however, the  
25 system may also be arranged such that when a switching  
designation is applied from the operation panel 1501 of  
the printer 1500, a current printer environment is

1 transferred to the host computer 100 and registered as  
separate registered files 3-1 to 3-3 in the RAM 3 or  
the hard disk 11. In this case, in accordance with a  
registered file call from the printer 1500, the  
5 separate registered files 3-1 to 3-3 are sent back to  
the printer 1500 in the order of registration and  
reproduced in the printer environment data storage area  
16a of the RAM 16.

Furthermore, in the above embodiment, the  
10 occurrence of switching between printer control  
language systems in the single host computer 100 is  
used as the printer setting change condition. The  
present invention, however, is also applicable to a  
system shared by a plurality of host computers and a  
15 plurality of printers. Alternatively, a designation  
made from the operation panel 1501 by a user may be  
used as the switching condition. The system may also  
be arranged such that a plurality of environmental mode  
set files are set to be usable by the same user and  
20 desired printer set information is reproduced in the  
printer environment data storage area 16a of the RAM 16  
by using a designation for calling a desired  
environmental mode set file as the switching condition.  
Note that the printer control system of the above  
25 embodiment has been described by taking the laser beam  
printer 1500 as an example, but the present invention

1 is, of course, applicable to the above-mentioned ink  
jet printer shown in Figs. 2 and 3 and the like.  
[3rd Embodiment]

The third embodiment of the present invention  
5 relates to processing in which, when a priority order  
is set for a plurality of printer control languages in  
a printer 1500 in the system of the first embodiment  
described above, a host computer 100 automatically  
switches to a printer driver corresponding to a printer  
10 control language with the highest priority and also  
switches a printer control language used in the printer  
1500 to the printer control language with the highest  
priority.

Fig. 11 is a flow chart showing an environmental  
15 setting switching sequence according to the third  
embodiment of the present invention.

The processing will be described with reference to  
the block diagram shown in Fig. 4 for explaining the  
environmental setting switching processing performed  
20 between the host computer 100 and the printer 1500.  
Note that the priority order of a plurality of printer  
control languages used in the printer 1500 may be fixed  
beforehand and stored in, e.g., a ROM 15, or a given  
priority order may be set at an operation panel 1501 of  
25 the printer and stored in, e.g., a RAM 16.

Referring to Fig. 11, in step S2001, a CPU 1 in  
the host computer 100 asks the printer 1500 the kind of

1 printer control language to which the printer 1500  
corresponds, and the flow advances to step S2002.

In step S2002, a CPU 14 in the printer 1500 checks  
whether printer control languages not informed to the  
5 host computer 100 remain in the printer 1500. If YES  
in S2002, the flow advances to S2003. If NO in step  
S2002, the processing is ended.

In step S2003, the CPU 14 sends to the host  
computer 100 information of a printer control language  
10 with the highest priority, among other printer control  
languages not informed to the host computer 100, on the  
basis of the priority information stored in, e.g., the  
RAM 16 of the printer 1500, and the flow advances to  
step S2004. The information of the priority order that  
15 is referred to in step S2003 is stored in, e.g., the  
RAM 16.

In step S2004, the kind of informed printer  
control language is stored in the RAM 16 of the printer  
1500, and the flow advances to step S2005. In this  
20 case, management of the information is performed by  
writing the information in an area assured in the RAM  
16.

In step S2005, the CPU 1 of the host computer 100  
receives the information sent in step S2003 by the CPU  
25 14 of the printer 1500, and the flow advances to step  
S2006.

1           In step S2006, the CPU 1 checks by referring to  
the table (not shown) explained in the first embodiment  
whether the host computer 100 has a printer driver  
corresponding to the printer control language  
5   information received in step S2005. If the host  
computer 100 has the corresponding printer driver in  
step S2006, the flow advances to step S2007; if not,  
the flow returns to step S2001.

          In step S2007, the CPU 1 of the host computer 100  
10   switches to the corresponding printer driver determined  
in step S2006 in order to perform printing by using  
this printer driver, and the flow advances to step  
S2008.

          In step S2008, in order to perform printing by  
15   using the corresponding printer control language  
determined in step S2006, the CPU 1 of the host  
computer 100 sends an instruction for switching to this  
printer control language to the printer 1500, and the  
flow advances to step S2009.

20           In step S2009, the CPU 14 of the printer 1500  
receives the instruction sent in step S2008, switching  
an operating printer control language to the designated  
printer control language, and ending the processing.

          As described above, the correspondence between a  
25   printer control language to which the printer  
corresponds and a printer driver to which the host  
computer corresponds is automatically obtained in

1 accordance with the priority order of printer control  
languages which is determined on the printer side, so  
correct printing results can be obtained constantly.  
[4th Embodiment]

5 The fourth embodiment of the present invention  
relates to processing in which, when a priority order  
is set for a plurality of printer drivers (stored in,  
e.g., a hard disk 11 shown in Fig. 4) of a host  
computer 100 in the system of the first embodiment  
10 described above, the host computer 100 automatically  
switches to a printer driver with the highest priority,  
among other printer drivers acquired from a printer  
1500 and corresponding to printer control language  
information usable in the printer 1500, and also  
15 switches a printer control language used in the printer  
1500 to a printer control language corresponding to the  
selected printer driver accordingly.

Figs. 12 and 13 are flow charts showing an  
environmental setting switching sequence according to  
20 the fourth embodiment of the present invention.

The processing will be described with reference to  
the block diagram shown in Fig. 4 for explaining the  
environmental setting switching processing performed  
between the host computer 100 and the printer 1500.

25 Note that the priority order of a plurality of  
printer drivers used in the host computer 100 may be  
fixed beforehand and stored in, e.g., a ROM 2, or a

1 given priority order may be set by using a keyboard 9  
or a pointing device (not shown) and stored in, e.g., a  
RAM 3.

Referring to Fig. 12, in step S3001, a CPU 1 in  
5 the host computer 100 asks the printer 1500 the kind of  
printer control language to which the printer 1500  
corresponds, and the flow advances to step S3002.

In step S3002, a CPU 14 in the printer 1500 sends  
to the host computer 100 the printer control language  
10 to which the printer 1500 corresponds, and the flow  
advances to step S3003. If the printer 1500  
corresponds to a plurality of printer control  
languages, the CPU 14 of the printer 1500 sends  
information of a plurality of printer control languages  
15 to the host computer 100 at one time.

In step S3003, the host computer 100 receives the  
information sent in step S3002 from the CPU 14 of the  
printer 1500, and the flow advances to step S3004.

In step S3004, the CPU 1 of the host computer 100  
20 checks whether all the received information is  
subjected to processing from steps S3005 to S3007 to be  
described below. If YES in step S3004, the flow  
advances to step S3005. If NO in step S3004, the flow  
advances to step S4001 shown in Fig. 13 through a route  
25 (1).

Note that the processing from steps S3005 to S3007  
is the comparison processing explained in the first

1     embodiment, and whether a printer driver corresponding  
to the printer control language information exists in  
the host computer 100 is determined by referring to the  
table (not shown) in the RAM 3 mentioned earlier in the  
5     first embodiment.

      In step S3005, one of the pieces of information  
concerning the unprocessed printer control languages  
checked in step S3004 is selected as an object to be  
processed, and the flow advances to step S3006.

10       In step S3006, the CPU 1 checks on the basis of  
the information related to the printer control language  
selected in step S3005, while referring to the  
above-mentioned table, whether the host computer 100  
has a printer driver corresponding to that printer  
15     control language. If YES in step S3006, the flow  
advances to step S3007. If NO in step S3006, the flow  
returns to step S3004.

      In step S3007, the kind of printer driver  
corresponding to the printer control language as an  
20     object to be processed is stored, and the flow returns  
to step S3004. In this case, the storage of the  
information is performed by writing the information in  
an area assured in the RAM 3.

      Referring to Fig. 13, in step S4001, the CPU 1  
25     reads out the information stored in step S3007 of  
Fig. 12 from the RAM 3 and checks whether a printer  
driver corresponding to the printer control language



1     that the printer 1500 has exists in the host computer  
100. If YES in step S4001, the flow advances to step  
S4002. If NO in step S4001, the processing is ended.

5     In step S4002, the CPU 1 further checks the  
information stored in step S3007 of Fig. 12 and selects  
a printer driver with the highest priority from printer  
drivers corresponding to the printer control language  
of the printer 1500, and the flow advances to step  
S4003. The information of the priority order of  
10   printer drivers is stored in, e.g., the RAM 3, the ROM  
2, or the hard disk 11.

15   In step S4003, the CPU 1 of the host computer 100  
switches to the printer driver selected in step S4002  
in order to perform printing by using this printer  
driver, and the flow advances to flow S4004.

20   In step S4004, in order to perform printing by  
using the printer control language selected in step  
S4002, the CPU 1 of the host computer 100 sends an  
instruction for switching to this printer control  
language to the printer 1500, and the flow advances to  
step S4005.

25   In step S4005, the CPU 14 of the printer 1500  
receives the instruction sent in step S4004, switching  
an operating printer control language to the designated  
printer control language, and ending the processing.

As described above, the matching between a printer  
control language to which the printer corresponds and a

1 printer driver to which the host computer corresponds  
is automatically obtained in accordance with the  
priority order of printer drivers which is determined  
on the host computer side. Therefore, correct printing  
5 results can be obtained constantly.

Note that in the above third and fourth  
embodiments, the timing at which the printer control  
language information is acquired is any of the printing  
start timing, the timing at which the system is  
10 initialized (the power source switch is turned on), and  
the timing at which a user designates the execution.

In this embodiment as has been described above,  
switching between printer drivers is designated on the  
basis of the printer control language information  
15 acquired from the memory of the printer connected to  
the host computer through the bidirectional interface,  
and the corresponding printer driver environment of the  
host computer is set in accordance with this switching  
designation. Therefore, even if the printer  
20 environment of the host computer does not match that of  
the printer connected to allow communications between  
them, an optimal printer driver can be set  
automatically by setting the matching printer  
environments.

25 In this embodiment, as has been described above,  
the first printer environment data stored in the memory  
of the printer connected to the host computer through

1 the bidirectional interface is acquired on the basis of  
the printer environmental switching status and  
registered as an internal file of the host computer.  
After this registration, the second printer environment  
5 data corresponding to the second printer environment is  
set in the memory of the printer, and the first printer  
environment data registered in the internal file is  
stored again in the memory of the printer on the basis  
of the end status of printing corresponding to the  
10 second printer environment. This makes it possible to  
reliably reproduce the setting status of the memory for  
each environment upon switching between the printer  
environments.

In addition, the system is arranged such that the  
15 switching between printer environments occurs when  
printer control language systems are switched, so the  
setting status of the memory of the printer for each  
environment can be reproduced reliably upon switching  
between the printer control language systems.

20 Even when, therefore, the host computer is  
connectable to a plurality of printers having different  
control language systems and the printer environment of  
the host computer does not match that of the printer  
connected to allow communications between them, the  
25 matching printer environments can be set automatically.  
This makes it possible to obtain correct printing  
results free from recording errors even if an operator

1 has failed to set the printer environment.

Furthermore, the printer setting information depending  
on a desired printer environment resident in a limited  
memory is resettable by the host computer. Therefore,  
5 a maximum memory area of the printer can be allocated  
to the printer control language system after printer  
environments are switched, resulting in highly  
efficient printing.

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